UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,100	10/22/2003	Richard V. Kisley	SJO9-2003-0008US	6561

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ART UNIT	PAPER NUMBER
2189	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
	10/692,100	KISLEY ET AL.
Office Action Summary	Examiner	Art Unit	
	Horace L. Flournoy	2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *22 October 2003*.

2a) ☐ This action is **FINAL.**   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-30* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-30* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *22 October 2003* is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/22/2003*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

The instant application having Application No. 10/692,100 has a total of **_30_**

claims pending in the application, there are **_6_** independent claims and **_24_** dependent

claims, all of which are ready for examination by the examiner.

Information Concerning Oath/Declaration

The applicant's oath/declaration has been reviewed by the examiner and is found

to conform to the requirements prescribed in **37 C.F.R. 1.63**.

Acknowledgement of References Cited by Applicant

Information Disclosure Statement

As required by **M.P.E.P.** 609(c), the applicant's submission of the Information

Disclosure Statement dated 11/21/200 is acknowledged by the examiner and the cited

references have been considered in the examination of the claims now pending. As

required by **M.P.E.P.** 609(c), a copy of the PTOL-1449 initialed and dated by the

examiner is attached to the instant office action.

Claim Objections

Claims 11, 13-16, and 29(27) objected to because of the following informalities:

The examiner believes that the limitation "The apparatus of claim 1" of Claim 11 is a typographical error. Is this a mistake? Claim 11, for the purposes of examination is interpreted as: "The apparatus of claim 10..."

The examiner believes that the limitation "The interface of claim 9" found in Claims 13-16 is a typographical error. Is this a mistake? Claims 13-16, for the purposes of examination are interpreted as: "The interface of claim 12..."

Claim 29 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 27. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamagami (U.S. PG Pub No. 2004/0268067 hereafter referred to as Yamagami).

With respect to independent claim 1,

"An apparatus for incremental data storage, the apparatus comprising: a baseline partition containing a baseline image..." is disclosed in paragraphs [0070], [0007], and [0068].

The examiner interprets the limitation "baseline partition" as the original or starting volume or partition.

Yamagami discloses in paragraph [0070], "The selected snapshot is incrementally updated by applying each journal entry, one at a time, to the snapshot in sequential order, thus reproducing the sequence of write operations." Yamagami further discloses in paragraph [0007], "Journaling is a backup and restore technique commonly used in database systems. An image of the data to be backed up is taken."

Yamagami teaches an apparatus for incremental data storage (selected snapshot is incrementally updated by applying each journal entry), the apparatus comprising: a baseline partition containing a baseline image (image of the data to be backed up is taken).

"...an incremental log configured to store data, the incremental log comprising at least one snapshot partition;" is disclosed in paragraphs [0070] and [0068].

Yamagami discloses in paragraph [0070], "The selected snapshot is incrementally updated by applying each journal entry, one at a time, to the snapshot in sequential order, thus reproducing the sequence of write operations." Yamagami also discloses in paragraph [0068], "The snapshot 520 represents the first snapshot image of the data volumes 101 belonging to a journal group 102."

Yamagami teaches an incremental log (journal) configured to store data, the incremental log comprising at least one snapshot partition (snapshot 520 represents the first snapshot image of the data volumes 101 belonging to a journal group).

"...and a partition module configured to automatically partition the incremental log into an additional snapshot partition in response to a snapshot operation." is disclosed in paragraphs [0055] and [0056].

The examiner interprets "partition module" as any device, element, or module found within a storage system that partitions. The examiner interprets the limitation "configured to automatically partition" as to initiate or start in response to an electronic operation. Therefore, in examination of an electronic apparatus, *automatically* doing something is interpreted also as *in response to* and the limitation of this claim is examined sans the word "automatically". Also see MPEP 2144.04. The meaning and usage of the word "automatically" in the following claims are hereafter interpreted in the same way by the examiner

Yamagami discloses in paragraph [0056], "It is possible that a snapshot image will be segmented or otherwise partitioned and stored in more than one snapshot volume. In this particular implementation, the offset identifies the ith snapshot volume which contains a portion (segment, partitioned, etc) of the snapshot image.

Yamagami teaches partitioning the incremental log into an additional snapshot partition in response to a snapshot operation (see paragraph [0055]).

With respect to claims 2, 18, and 28,

"The apparatus of claim 1, wherein the partition module is further configured to assign a volume identifier to a newly formed partition as directed by a storage management policy." is disclosed in paragraph [0054].

Yamagami discloses in paragraph [0054], "The management table includes a list of journal volumes (JVOL_LIST) 340 associated with a particular journal group 102. In a particular implementation, JVOL_LIST is a pointer to a data structure of information for journal volumes. As can be seen in FIG. 3, each data structure comprises an offset number (JVOL OFS) 341 which identifies a particular journal volume 106 associated with a given journal group 102. For example, if a journal group is associated with two journal volumes 106, then each journal volume might be identified by a 0 or a 1. A journal volume identifier (JVOL_ID) 342 uniquely identifies the journal volume within the storage system 100. Finally, a pointer (JVOL NEXT) 344 points to the next data

structure entry pertaining to the next journal volume associated with the journal group; it

is a NULL value otherwise."

Yamagami teaches (the partition module) is further configured to assign a

volume identifier (volume identifier) to a newly formed partition (journal volume) as

directed by a storage management policy (management table).

(Note: the preamble of claims 13-16 are examined as "The interface of claim 12..." See

objection to claims above)

With respect to claims 3, 6, and 13,

"The apparatus of claim 1, further comprising a storage management module

configured to support storage management policies selected from the group

consisting of temporal-based policies, status-based policies, and event-based

policies." is disclosed in paragraphs [0043] – [0047] and FIG. 3.

Yamagami discloses in paragraphs [0043] – [0047]. "FIG. 3 shows detail about

the management table 108 (FIG. 1). In order to manage the Journal Header Area 210

and Journal Data Area 220, pointers for each area are needed. As mentioned above,

the management table maintains configuration information about a journal group 102

and the relationship between the journal group and its associated journal volume(s) 106

and snapshot image 105...A journal attribute (GRATTR) 312 is associated with the

journal group 102. In accordance with this particular implementation, two attributes are

defined: MASTER and RESTORE. The MASTER attribute indicates the journal group is

being journaled. The RESTORE attribute indicates that the journal group is being

restored from a journal...A journal status (GRSTS) 315 is associated with the journal

group 102. There are two statuses: ACTIVE and INACTIVE...The management table

includes a field to hold a sequence counter (SEQ) 313. This counter serves as the

source of sequence numbers used in the Journal Header 219. When creating a new

journal, the sequence number 313 is read and assigned to the new journal. Then, the

sequence number is incremented and written back into the management table."

Yamagami teaches a storage management module (management table)

configured to support storage management policies selected from the group consisting

of temporal-based policies (sequence counter), status-based policies (statuses: ACTIVE

and INACTIVE), and event-based policies (two attributes are defined: MASTER and

RESTORE). With respect to claim 13, Yamagami teaches a policy assignment function

(management table) configured to assign a policy to an incremental log (see above).

With respect to claim 9,

> "The apparatus of claim 1, further comprising a copy module configured to copy
>
> selected log entries to the tertiary volume." is disclosed in paragraph [0028].

Yamagami discloses in paragraph [0028], "The associated journal records the

order of write operations from the host to the data volumes in proper sequence. The

journal data produced by the journaling activity can be stored in one or more journal

volumes (JVOL) 106."

Yamagami teaches a copy module (storage system 100 of FIG.1) configured to

copy selected log entries to the tertiary volume (journal records the order of write

operations from the host to the data volumes in proper sequence). Note: Yamagami

teaches a third subset of storage devices observed in elements 106 (or 105).

With respect to claim 14,

"The interface of claim 9, further comprising a read next entry function configured

to retrieve a sequential entry from the incremental log." is disclosed in paragraph

[0070].

Yamagami discloses in paragraph [0070], "The selected snapshot is

incrementally updated by applying each journal entry, one at a time, to the snapshot in

sequential order, thus reproducing the sequence of write operations."

With respect to claim 16,

"The interface of claim 9, further comprising a delete volume function configured

to release a snapshot volume." is disclosed in paragraph [0082], [0083], and

page 7, claim 2.

Yamagami discloses on page 7, claim 2, "wherein removing one or more journal

entries includes updating the first snapshot by applying one or more journal entries to

the first snapshot, beginning with an oldest journal entry, wherein journal entries applied

to the first snapshot are removed from the list of journal entries thereby increasing the

free space of the journal data store."

Yamagami teaches a delete volume function (remove journal entry) configured to

release a snapshot volume (journal entries updated).

With respect to independent claims 17 and 26,

(Note: see 103 rejection below for further details on claim 26)

"A method for managing incremental data storage," is disclosed as stated supra

in claim 1.

"...the method comprising appending data to an incremental log;"

Yamagami discloses in paragraph [0070], "The selected snapshot is

incrementally updated by applying each journal entry, one at a time, to the snapshot in

sequential order, thus reproducing the sequence of write operations."

Yamagami teaches appending data (applying each journal entry) to an

incremental log.

"...automatically partitioning the incremental log in response to a snapshot

operation; and..."

Yamagami discloses in paragraph [0056], "It is possible that a snapshot image

will be segmented or otherwise partitioned and stored in more than one snapshot

volume. In this particular implementation, the offset identifies the ith snapshot volume

which contains a portion (segment, partitioned, etc) of the snapshot image."

Yamagami teaches partitioning the incremental log into an additional snapshot

partition in response to a snapshot operation (see paragraph [0055]).

"...automatically assigning a volume identifier to a newly formed partition." is

disclosed as stated supra in claim 2.

With respect to independent claim 21,

Claim 21 is interpreted under 35 U.S.C. 112, 6th paragraph.

The Court of Appeals for the Federal Circuit, in its en banc decision In re Donaldson Co., 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994), decided that a "means-or-step-plus-function" limitation should be interpreted in a manner different than patent examining practice had previously dictated. The Donaldson decision affects only the manner in which the scope of a "means or step plus function" limitation in accordance with 35 U.S.C. 112, sixth paragraph, is interpreted during examination. Donaldson does not directly affect the manner in which any other section of the patent statutes is interpreted or applied.

When making a determination of patentability under 35 U.S.C. 102 or 103, past practice was to interpret a "means or step plus function" limitation by giving it the "broadest reasonable interpretation." Under the PTO's long-standing practice this meant interpreting such a limitation as reading on any prior art means or step which performed the function specified in the claim without regard for whether the prior art means or step was equivalent to the corresponding structure, material or acts described in the specification. However, in Donaldson, the Federal Circuit stated:

Per our holding, the "broadest reasonable interpretation" that an examiner may give means-plus-function language is that statutorily mandated in paragraph six. Accordingly, the PTO may not disregard the structure disclosed in the specification corresponding to such language when rendering a patentability determination. (MPEP 2181)

Accordingly, the Examiner notes that the means or system/structure for practice of the

invention disclosed in Claim 21, of applicant's specification is further taught in claims 1,

7, and 17 as stated in the present action.

With respect to independent claim 22,

"A system for redundant incremental data storage, the system comprising:" is

disclosed in claim 1 and claim 25 below.

"...a primary storage device configured to store data;" is disclosed in paragraphs

[0031]-[0034], and FIG. 1.

"...a secondary storage device configured to store data within a baseline volume"

is disclosed in paragraphs [0031]-[0034], and FIG. 1.

"...and an incremental log comprising at least one snapshot partition that

corresponds to a snapshot volume;" is disclosed as stated supra in claim 1, as

well as paragraphs [0030]-[0034], and FIG. 1

Yamagami discloses in paragraph [0034], "The Journal Header 219 comprises

an offset number (JH_OFS) 211. The offset number identifies a particular data volume

101 in the journal group 102. In this particular implementation, the data volumes are

ordered as the 0.sup.th data volume, the 1.sup.st data volume, the 2.sup.nd data

volume and so on. The offset numbers might be 0, 1, 2, etc."

Yamagami teaches an incremental log (journal) comprising at least one snapshot

partition that corresponds to a snapshot volume (data volume 101 in the journal group

102).

"...a controller configured to store and access data on the primary and secondary

storage device;" is disclosed in paragraph [0032] and FIG. 1, element 140.

Yamagami discloses in paragraph [0032], "A controller component 140 is also

provided which coordinates the journaling of write operations and snapshots of the data

volumes, and the corresponding movement of data among the different storage

components 101, 106, 107.

Yamagami teaches a controller configured to store and access data (journaling of

write operations) on the primary and secondary storage device (storage components

101, 106, 107).

"...and a snapshot management module configured to automatically partition the

incremental log into an additional snapshot partition and associate the additional

snapshot partition with a volume identifier in response to a snapshot operation."

is disclosed as stated supra in claim 17.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set
forth in section 102 of this title, if the differences between the subject matter sought to be patented and
the prior art are such that the subject matter as a whole would have been obvious at the time the
invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere* CO., 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating
      obviousness or nonobviousness.

Claims 4, 5, 8, 15, 20, 23 and 30 are rejected under 35 U.S.C. 103(a) as being

obvious over Yamagami (U.S. PG Pub No. 2004/0268067) in view of Tzelnic et al. (US

Patent No. 6,366,987 hereafter referred to as Tzelnic).

With respect to claim 4, Yamagami teaches "The apparatus of claim 1..." as

stated supra.

Yamagami, however, does not disclose expressly "...further comprising a

compaction module configured to compact a snapshot partition."

Tzelnic discloses in column 14, lines 33-40, "The amount of additional backup

data storage can also be reduced by performing procedures after the backup data has

been written from the primary data storage subsystem to the secondary data storage

subsystem. In general, the additional procedures performed after the backup data has

been written from the primary data storage subsystem to the secondary data storage

subsystem have the effect of compaction." Tzelnic further discloses in FIG. 7 primary

and secondary storage subsystems (module) that compact a snapshot copy, partition,

or volume. (Note: Tzelnic also teaches the conduction of compaction as directed by a

storage management policy of claim 5. Tzelnic discloses in paragraph 1, lines 34-39,

"...the development of services for storage management has lagged behind the

increase in storage to be managed. Consequently, the cost of storage management

has become relatively more significant. More troubling is the difficulty of maintaining the

same level of management service as the amount of storage increases..." Also, the

limitation "automatically" is stated supra in regards to interpretation)

Yamagami and Tzelnic are analogous art because they are from the same field

of endeavor, that being backup storage systems.

At the time of the invention it would have been obvious to a person of ordinary

skill in the art to combine a compaction module configured to compact a snapshot

partition with the apparatus of claim 1.

The motivation for doing so would have been obvious based on the teaching of

Tzelnic in column 14, lines 41-47, "Compaction procedures can easily reduce the

amount of required backup data storage by any excess data storage in the physical

storage unit over the size of a file system or database contained in the physical storage

unit, and can also easily reduce the amount of the required backup data storage by the

amount of any contiguous free data storage at the end of the file system or database

(such as the not yet used file space 116 shown in the file system 110 of FIG. 6).

Therefore, it would have been obvious to one of ordinary skill in the art at the

time of the invention having the teachings of Yamagami and Tzelnic before him/her to

combine Tzelnic and Yamagami for the benefit of having a compaction module

configured to compact a snapshot partition with the apparatus of claim 1 to obtain the

invention as specified in claim 4.

Claims 7, 19, 24, 25, 27, and 29 and 30 are rejected under 35 U.S.C. 103(a) as

being obvious over Yamagami (U.S. PG Pub No. 2004/0268067) in view of Tzelnic et al.

(US Patent No. 6,366,987 hereafter referred to as Tzelnic).

With respect to claim 7, Yamagami teaches "The apparatus of claim 4..." as

stated supra.

Yamagami, however, does not disclose expressly "...wherein the compaction

module is further configured to conduct in-place compaction."

Tzelnic discloses in column 18, lines 13-19, "With reference to FIG. 10, there is

shown a flowchart of a specific example of a procedure for compaction of a backed-up

file system. This procedure could be performed as a background process in a

secondary data storage subsystem. The procedure, for example, deletes files of the file

system that have expired or that a user or application program did not request to be

backed up."

Tzelnic also discloses in column 10, lines 5-18, "The data storage subsystem 41

is constructed for high data availability so that a single high-capacity data storage

subsystem is at least as fault-tolerant as a local collection of conventional network data

storage servers. Fault tolerance is ensured by dual redundant components and busses

in the path from each port adapter 55 to any one of the disk drives 59, 60, 61,

62. Mirroring or RAID (redundant array of inexpensive disks) techniques ensure that

the storage adapters 57, 58 can recover data in the event of failure of any one of the

disk drives. See, for example, Patterson et al., "Introduction to Redundant Arrays of

Inexpensive Disks (RAID))," COMPCON 89 Proceedings, Feb. 27-Mar. 3, 1989, IEEE

Computer Society, p. 112-117, incorporated herein by reference." (Note: Tzelnic

teaches the primary storage device comprises a plurality of redundantly arranged

storage devices. Also see background of the invention)

Yamagami and Tzelnic are analogous art because they are from the same field

of endeavor, that being backup storage systems.

At the time of the invention it would have been obvious to a person of ordinary

skill in the art to combine a compaction module configured to conduct in-place

compaction.

The motivation for doing so would have been obvious based on the teaching of

Tzelnic in column 14, lines 41-47, "Compaction procedures can easily reduce the

amount of required backup data storage by any excess data storage in the physical

storage unit over the size of a file system or database contained in the physical storage

unit, and can also easily reduce the amount of the required backup data storage by the

amount of any contiguous free data storage at the end of the file system or database

(such as the not yet used file space 116 shown in the file system 110 of FIG. 6). Tzelnic

also teaches in column 10, lines 11-18, "Mirroring or RAID (redundant array of

inexpensive disks) techniques ensure that the storage adapters 57, 58 can recover data

in the event of failure of any one of the disk drives. See, for example, Patterson et al.,

"Introduction to Redundant Arrays of Inexpensive Disks (RAID))," COMPCON 89

Proceedings, Feb. 27-Mar. 3, 1989, IEEE Computer Society, p. 112-117, incorporated

herein by reference."

Therefore, it would have been obvious to one of ordinary skill in the art at the

time of the invention having the teachings of Yamagami and Tzelnic before him/her to

combine Tzelnic and Yamagami for the benefit of having a compaction module

configured to compact a snapshot partition with the apparatus of claim 1 to obtain the

invention as specified in claim 4.

Claims 10-12 are rejected under 35 U.S.C. 103(a) as being obvious over

Yamagami (U.S. PG Pub No. 2004/0268067) in view of Berkowitz et al. (US Patent No.

6,826,666 hereafter referred to as Berkowitz).

With respect to claims 10 and 11, Yamagami teaches "The apparatus of claim

1..." as stated supra.

Yamagami, however, does not disclose expressly "...further comprising a read

module configured to retrieve the most recent data corresponding to a block address" or

"...wherein the read module is further configured to retrieve the most recent data corresponding to a specified snapshot volume and block address."

Berkowitz discloses in column 8, lines 3-7, "As part of the document, the layer 304 includes a point-in-time copy description based on the original set of volumes and information received from a provider 306 as to the set of LUN copies created for each point-in-time volume copy."

Berkowitz also discloses in column 10, lines 3-6, "An import module 332 may be incorporated into the point-in-time interface 304. The import module 332 packages information received from the providers relating to the location of a physical copy on storage subsystem 308. (Note: also see Retrieve Module of FIG. 1)

Yamagami and Berkowitz are analogous art because they are from the same field of endeavor, that being backup storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine an apparatus of claim 1 with the read modules of claims 10 and 11.

The motivation for doing so would have been obvious based on the teaching of Berkowitz in column 22, lines 66 – column 23, lines 1-6, "...the above system and method provides the ability to describe a LUN in such a way that it can be transported and discovered on the machine to which it is transported without additional processing. The method also allows for combining multiple volumes into a copy set and transporting the set as a group."

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having the teachings of Yamagami and Berkowitz before him/her to combine Berkowitz and Yamagami for the benefit of having a read module configured to retrieve the most recent data corresponding to a specified snapshot volume an block address with the apparatus of claim 1 to obtain the invention as specified in claims 10 and 11.

With respect to independent claim 12, Yamagami teaches "An interface for managing incremental data storage... and a snapshot function configured to automatically partition the incremental log into a first and a second volume." as stated supra.

Yamagami, however, does not disclose expressly "... the interface comprising: a write function configured to append an entry to an incremental log; a read function configured to retrieve a most recent log entry corresponding to a block address..."

Berkowitz discloses in column 8, lines 3-7, "As part of the document, the layer 304 includes a point-in-time copy description based on the original set of volumes and information received from a provider 306 as to the set of LUN copies created for each point-in-time volume copy."

Berkowitz also discloses in column 10, lines 3-6, "An import module 332 may be incorporated into the point-in-time interface 304. The import module 332 packages information received from the providers relating to the location of a physical copy on storage subsystem 308. (Note: also see Retrieve Module of FIG. 1)

Yamagami and Berkowitz are analogous art because they are from the same field of endeavor, that being backup storage systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine an interface for managing incremental data storage with the read and write functions of claim 12.

The motivation for doing so would have been obvious based on the teaching of Berkowitz in column 22, lines 66 – column 23, lines 1-6, "...the above system and method provides the ability to describe a LUN in such a way that it can be transported and discovered on the machine to which it is transported without additional processing. The method also allows for combining multiple volumes into a copy set and transporting the set as a group."

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention having the teachings of Yamagami and Berkowitz before him/her to combine Berkowitz and Yamagami for the benefit of having an interface for managing incremental data storage with the read and write functions to obtain the invention as specified in claim 12.

Claims 26-30 are rejected under 35 U.S.C. 103(a) as being obvious over Yamagami (U.S. PG Pub No. 2004/0268067) in view of "Structured Computer Organization" 2nd edition, by Tanenbaum (hereafter referred to as Tanenbaum).

With further respect to independent claim 26, as well as dependent claims 27-30, Yamagami does not disclose expressly, "A computer readable image for managing incremental data storage, the computer readable image comprising program code..."

Tanenbaum discloses, "*Hardware and software are logically equivalent.* Any operation performed by software can also be built directly into the hardware and any instruction executed by the hardware can also se simulated in software" (page 11).

Yamagami and Tanenbaum are analogous art because they are from the same field of endeavor, that being computer architecture.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement a method for managing incremental data storage (hardware) as a computer readable image comprising program code to arrive at claims 26-30.

The motivation for doing so would have been obvious based on the teaching of Tanenbaum on page 11 "*Hardware and software are logically equivalent.* Any operation performed by software can also be built directly into the hardware and any instruction executed by the hardware can also se simulated in software."

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement previous claims in software thereby obtaining the inventions as specified in claims 26-30.

Conclusion

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Horace L. Flournoy whose telephone number is (571) 272-2705. The examiner can normally be reached on Monday-Friday 7:00 AM to 4:30 PM (ET).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Sparks can be reached on (571) 272-4201. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 746-7239

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2100.

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